APPENDIX D
Simulated San Joaquin River System Hydrographs

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C-104640

October 6, 1992
HTM

Simulated San Joaquin River System Hydrographs
Assuming that Numerous Spreading Areas are Available
for Receiving Flood Water Diversions

The purpose of the attached data is to roughly demonstrate the impact that diversion of flood flows along the San Joaquin River may have on flows within the river at a few key locations. Chart 1 shows data provided by the San Joaquin River Branch, Water Resource Planning Division depicting potential spreading areas. Chart 2 shows how the areas were combined and assumptions about diversion rates made by the Reservoir Control Section. Chart 3 is a diagram of the system. The hydrograph plots, Chart 4, show the impacts of the spreading areas under various flow conditions with and without the spreading areas. The flow conditions are an approximation of a 10-year flood (simulated on an hourly basis), an approximation of a 50-year flood (simulated on an hourly basis), and a simulation of flow throughout the San Joaquin River system for the last 17 years (simulated on a daily basis). Chart 5 provides approximate frequencies assigned to the maximum 1-day flows that occur each year during the 17 year simulation.

All project data (channel capacities, reservoirs storage etc...), other than the spreading areas, represents conditions existing in 1992. The reservoir storages at the start of the 10-year and the 50-year floods are median storages on the 1st of January. Median storages on the 1st of October were used to start the 17 year simulation. During all simulations, operation parameters (irrigation demand, time to evacuate flood space, loss rates etc...) were representative of present operation objectives for power, irrigation, water quality, and flood control.

The data (diversion rates and channel flows at which the diversions were started) provided on Chart 2 were subjectively developed from some preliminary runs to try and use the spreading areas effectively for flood control. It was assumed that diversion rates could rapidly be increased or curtailed, so diversion structures will most likely have to have some type of gates. These conditions are just one of an infinite number of possible combinations, but will hopefully serve as reasonable starting point for discovering how to best utilize these areas so that flood control and other beneficial uses can be served. The data provided by the reservoir control section has not been coordinated with any land owners.

The following very rough assumptions were made to try and include some representation of losses within the spreading areas and return flow to the river. Percolation and other losses were assumed to be 1 inch per day. Half of the losses were returned to the river. The effective area at the spreading locations was interpolated assuming that the depth at any of the locations

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would be 5 feet when full. We realize that some of the diverted water will not be able to return to the river for long periods if the river is higher than the spreading area. However, out model was calibrated to reflect historic losses along the river, and the ponding of water on the land side of the river may reduce losses due to seepage. We encourage any input from those who are familiar with the areas in question. We have not visited the sites.

15 SEP 92

SAN JOAQUIN RIVER MAINSTEM

DIVERSION VOLUMES

REACH[1]	VOLUME (ac-ft)
4-7 (@4)	50,000
4-7	16,600
8-9	20,430
8-10	14,181
9-11	66,841 + 12400 = 79,241
@10	620
10-11	12,028
12-13	7,465
TOTAL	188,165

[1] Reaches taken from Routing Diagram, San Joaquin River Basin Hydrology Report (draft)

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Chart 1

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SAN JOAQUIN RIVER MAINSTEM STUDY						
REACH	ROUTING DIAGRAM REACH	DIVERSION VOLUME (ac-ft)	CHANNEL CAPACITY	BEGIN DIVERSIONS AT	MAX DIVERSION (cfs)	MAX PERCOLATION (cfs)
A & B	4-7	66,600	6,500	1,000	1,500	550
C	8-9	20,430	8,500	2,000	750	150
D	8-10	14,181	12,000	6,000	500	100
E	9-11	79,241	10,000	1,000	2,000	650
F & G	10-11	12,648	18,500	6,000	1,000	100
H	12-13	7,465	26,000	6,000	200	50
TOTAL	N/A	200,565	N/A	N/A	5,950	1,600

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Chart 2

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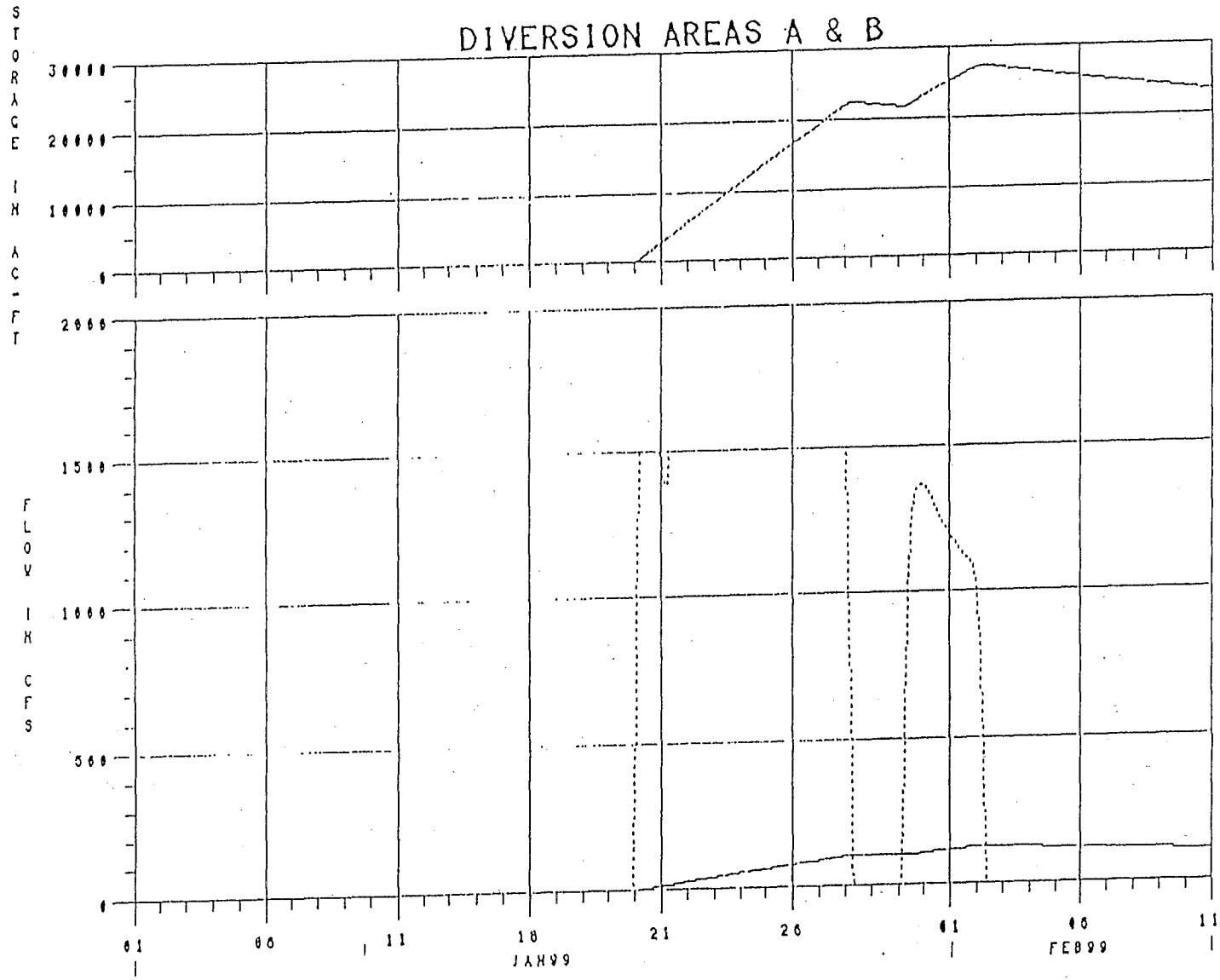

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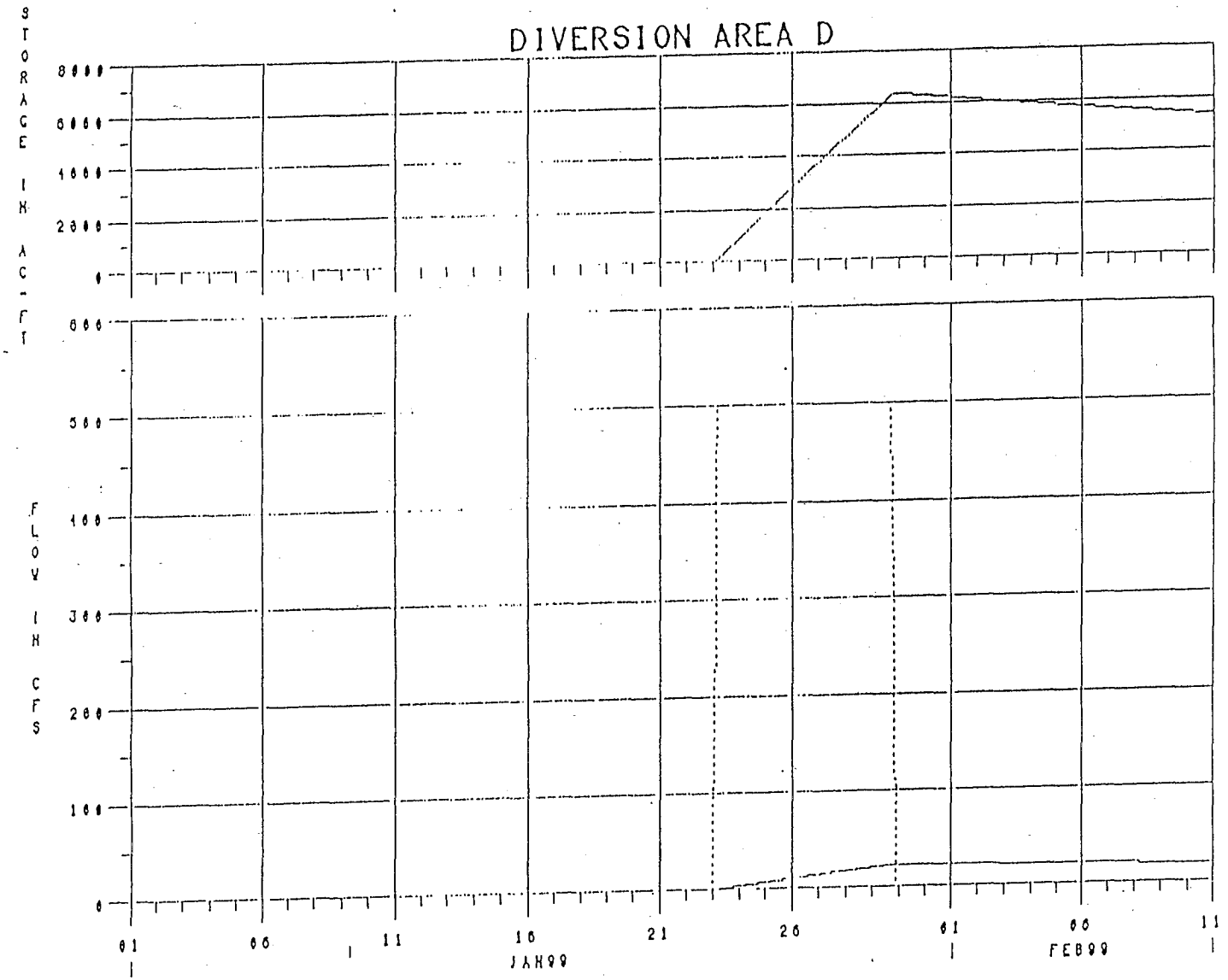

SIMULATED 10 YEAR INFLOW (1992 CONDITIONS)
SIMULATED 10 YEAR FLOW BACK TO RIVER (1992 CONDITIONS)
SIMULATED 10 YEAR STORAGE (1992 CONDITIONS)

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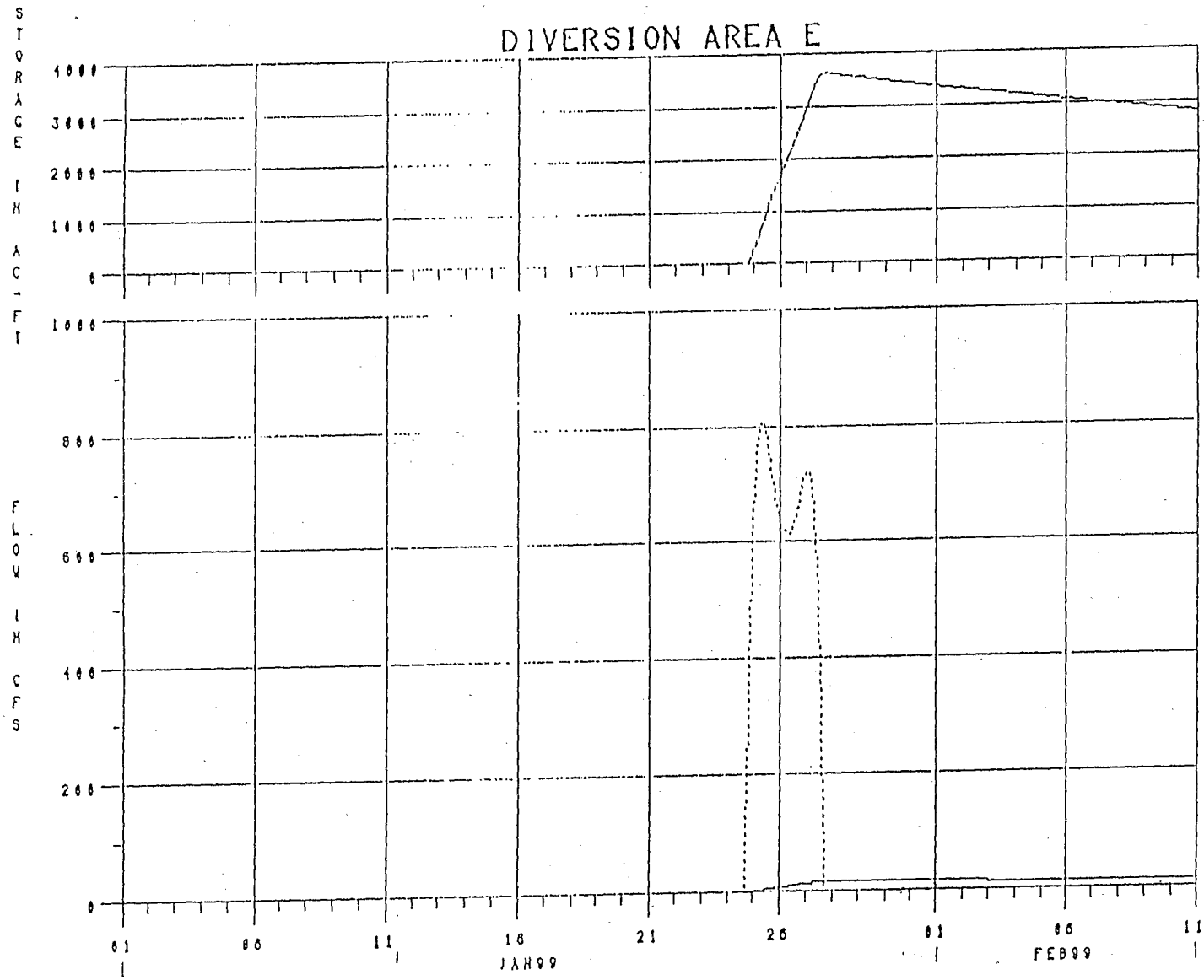

..... SIMULATED 10 YEAR INFLOW (1992 CONDITIONS)

——— SIMULATED 10 YEAR FLOW BACK TO RIVER (1992 CONDITIONS)

——— SIMULATED 10 YEAR STORAGE (1992 CONDITIONS)

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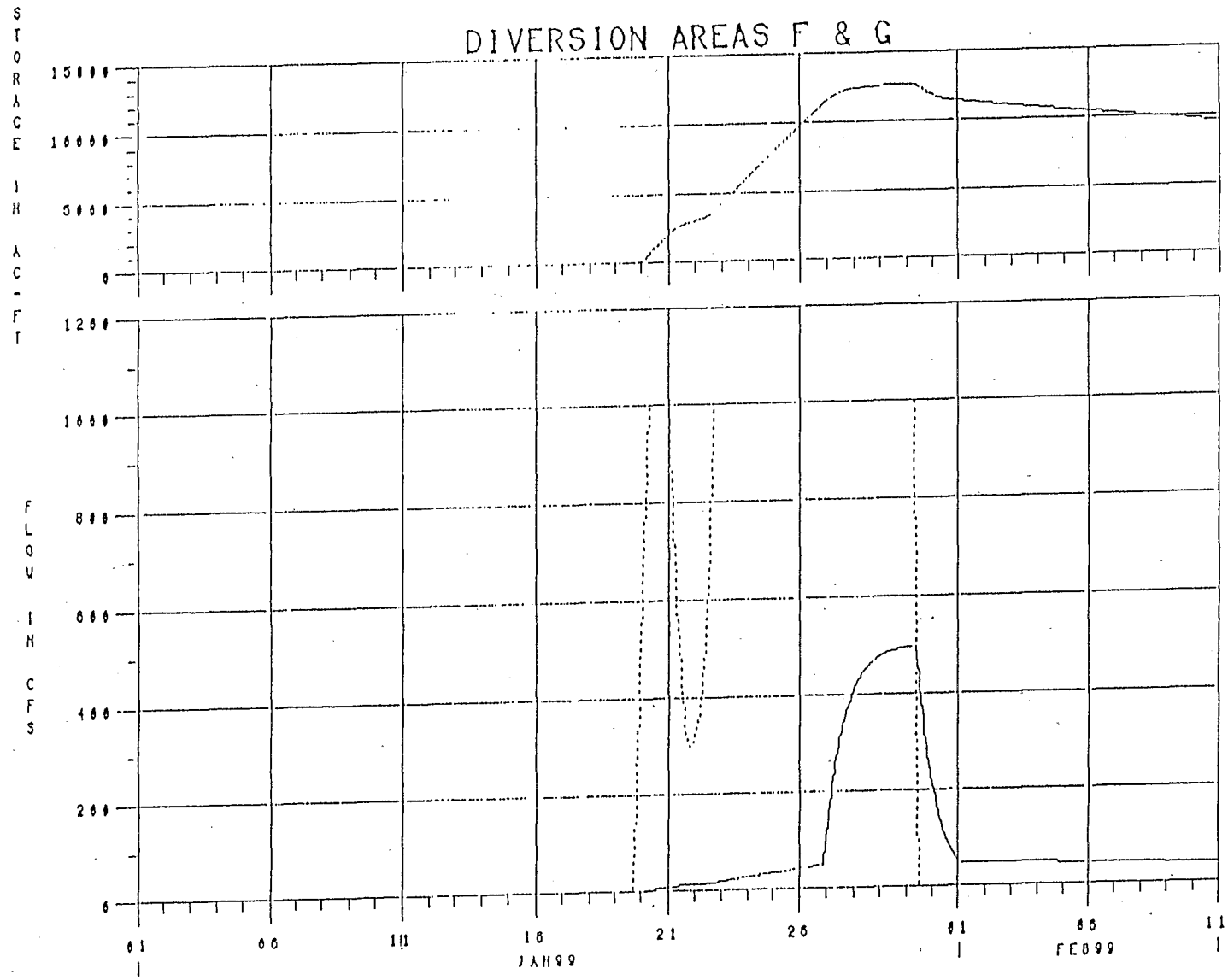

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SIMULATED 10 YEAR FLOW BACK TO RIVER (1992 CONDITIONS)
SIMULATED 10 YEAR STORAGE (1992 CONDITIONS)

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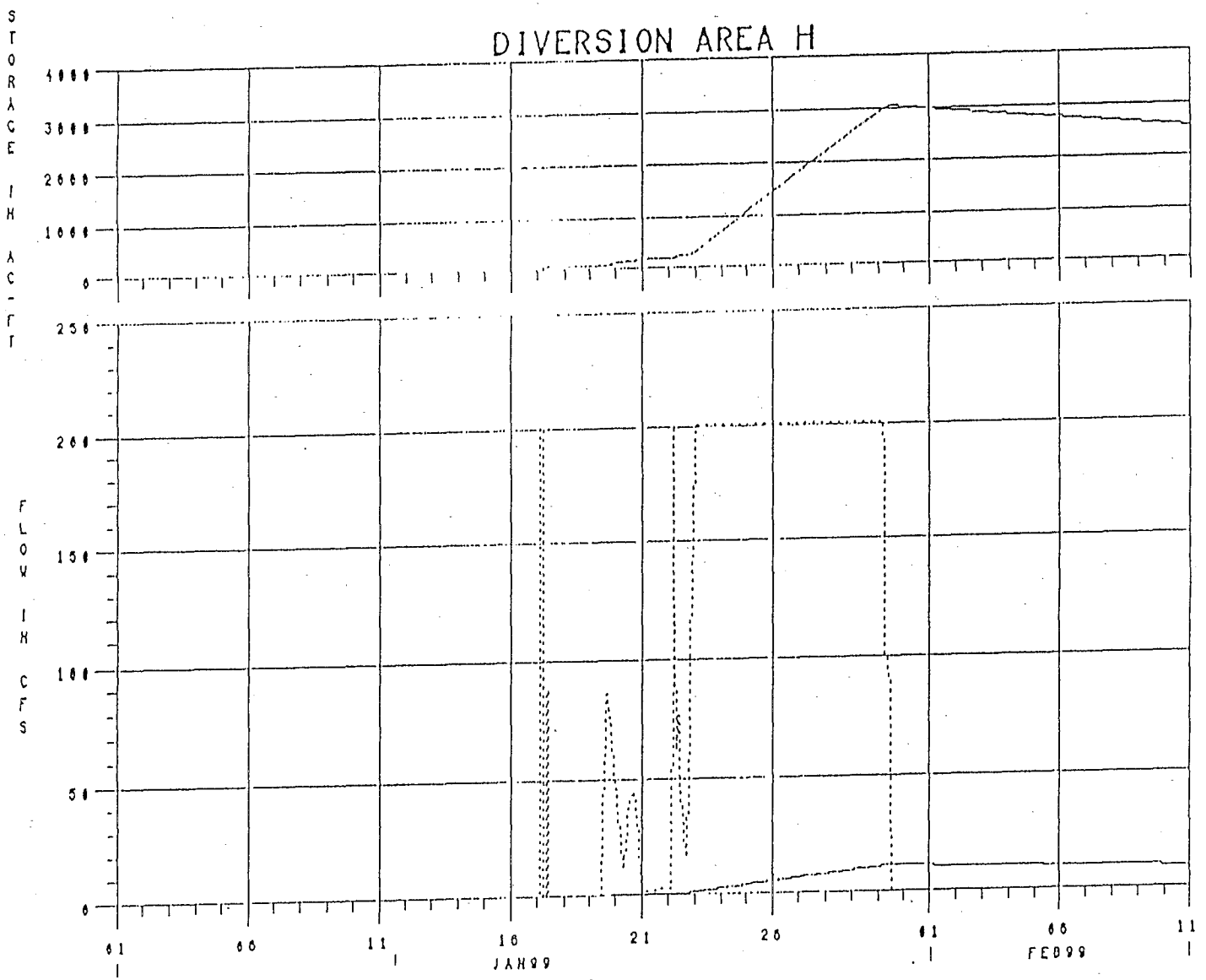

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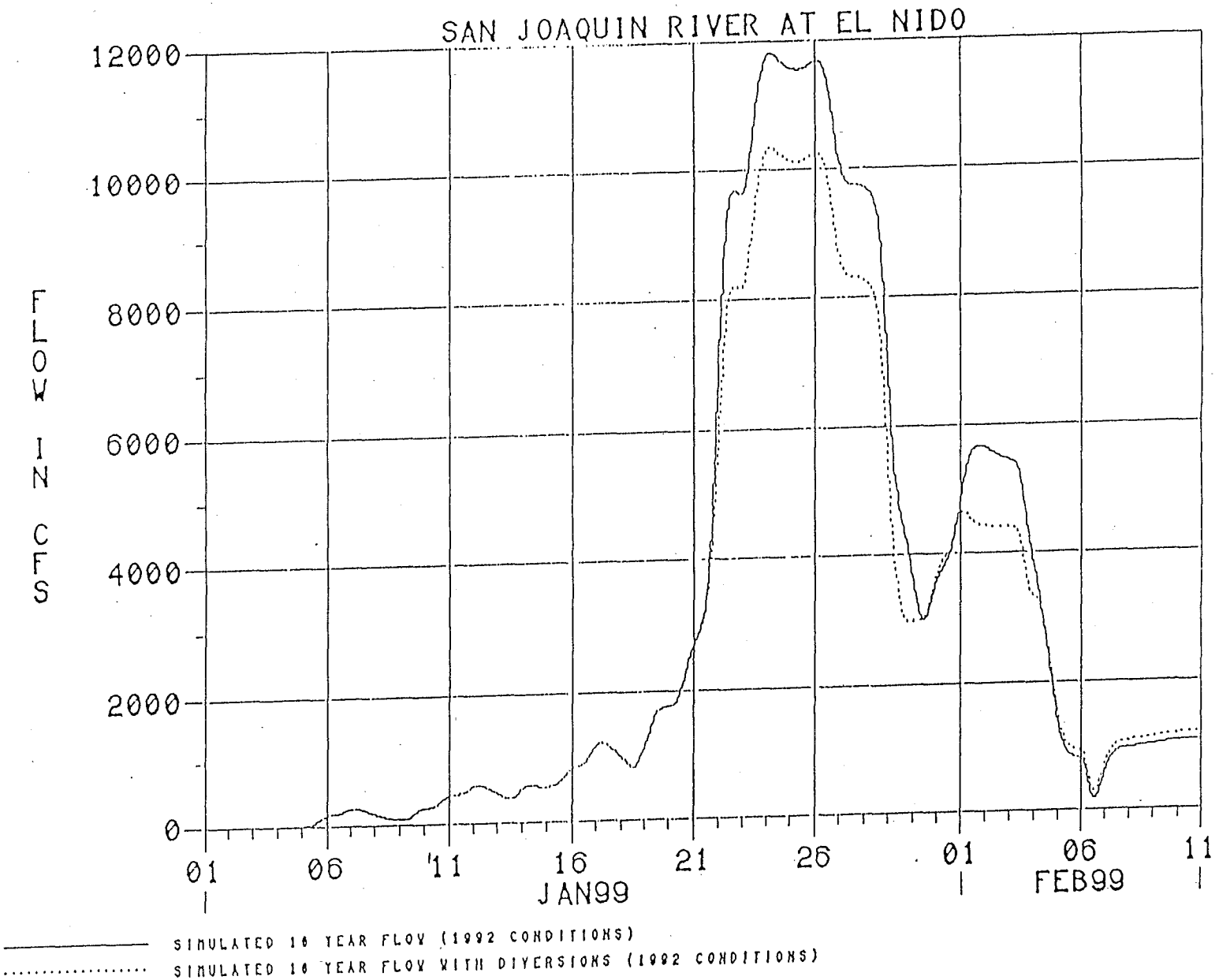

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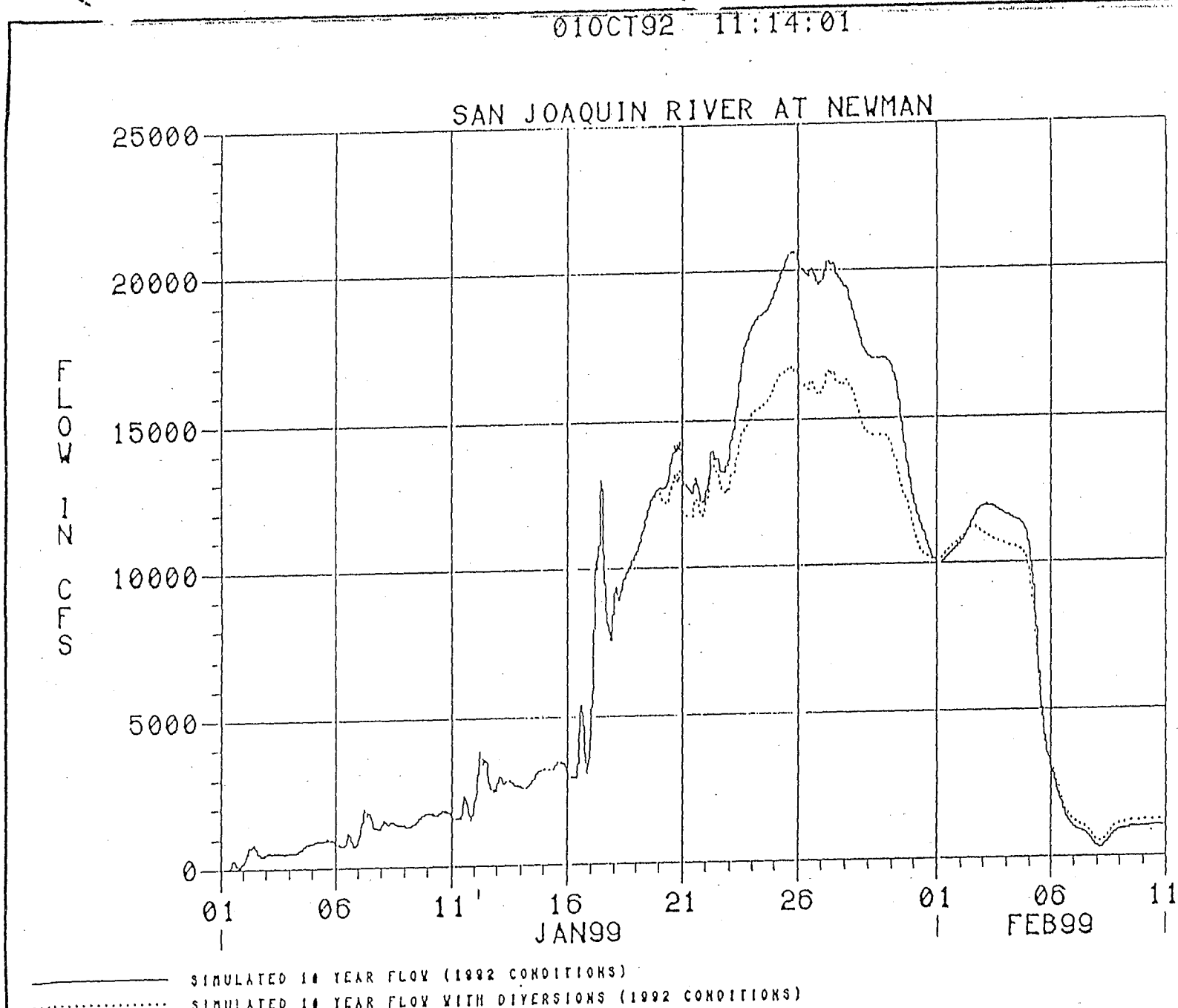

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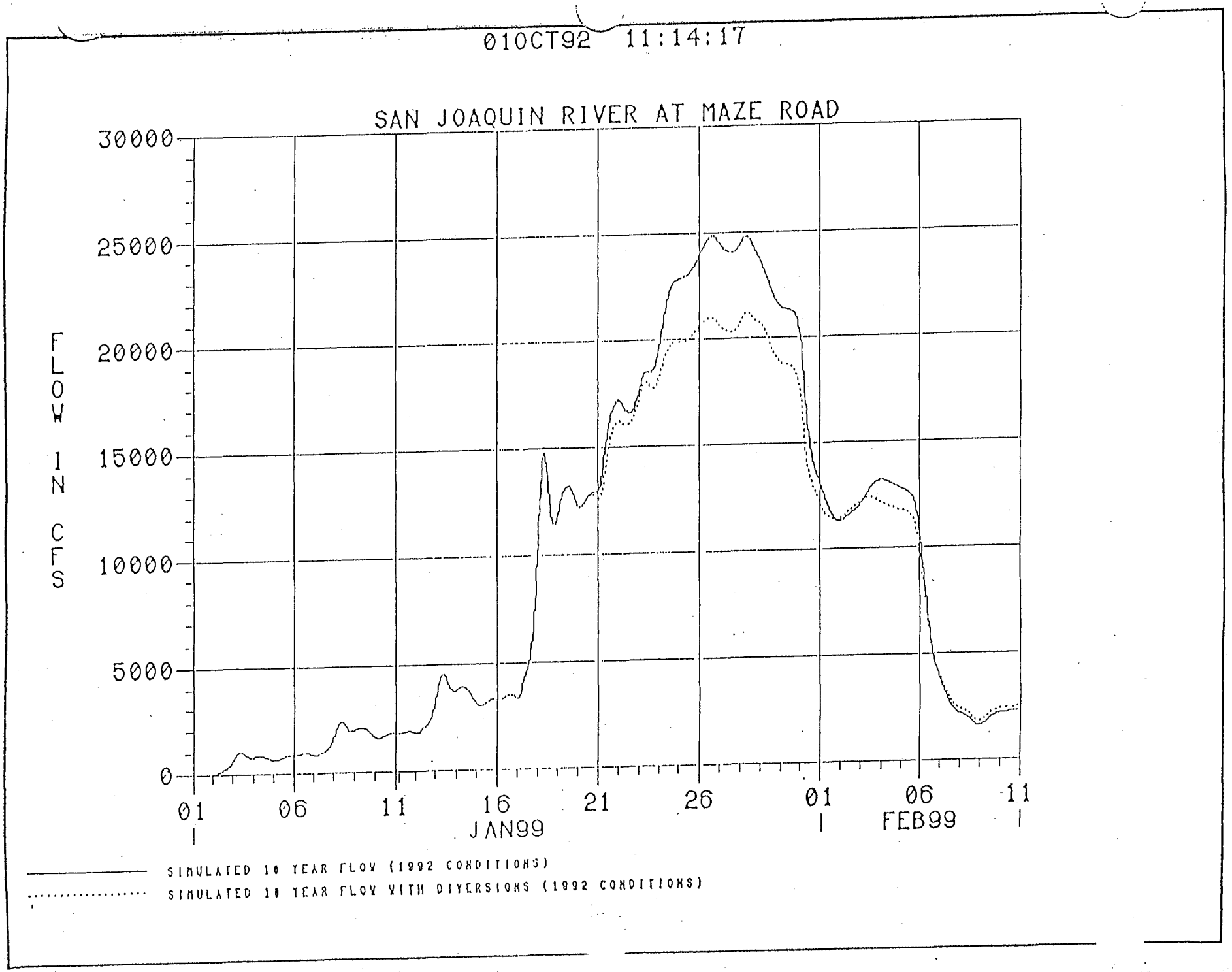

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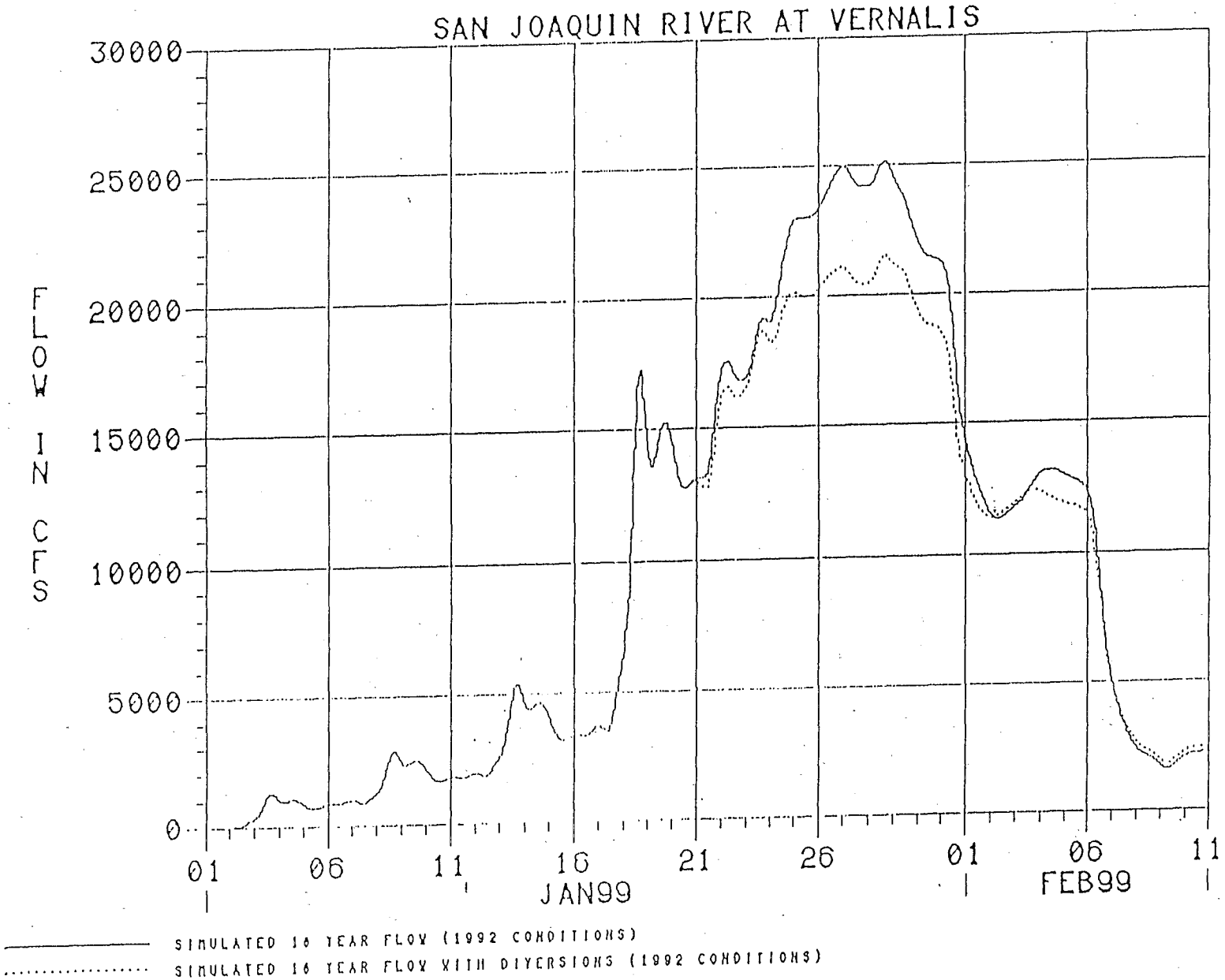

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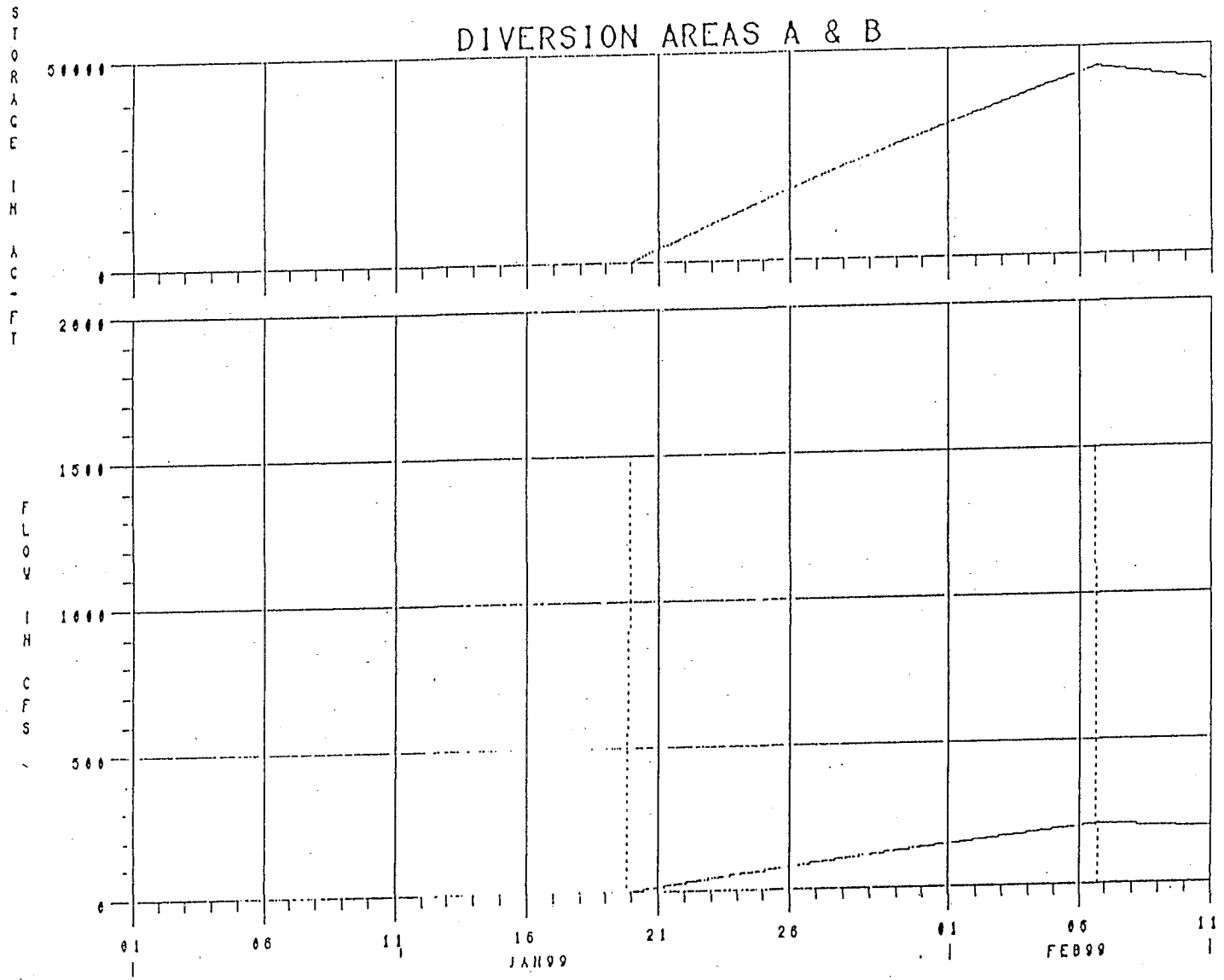

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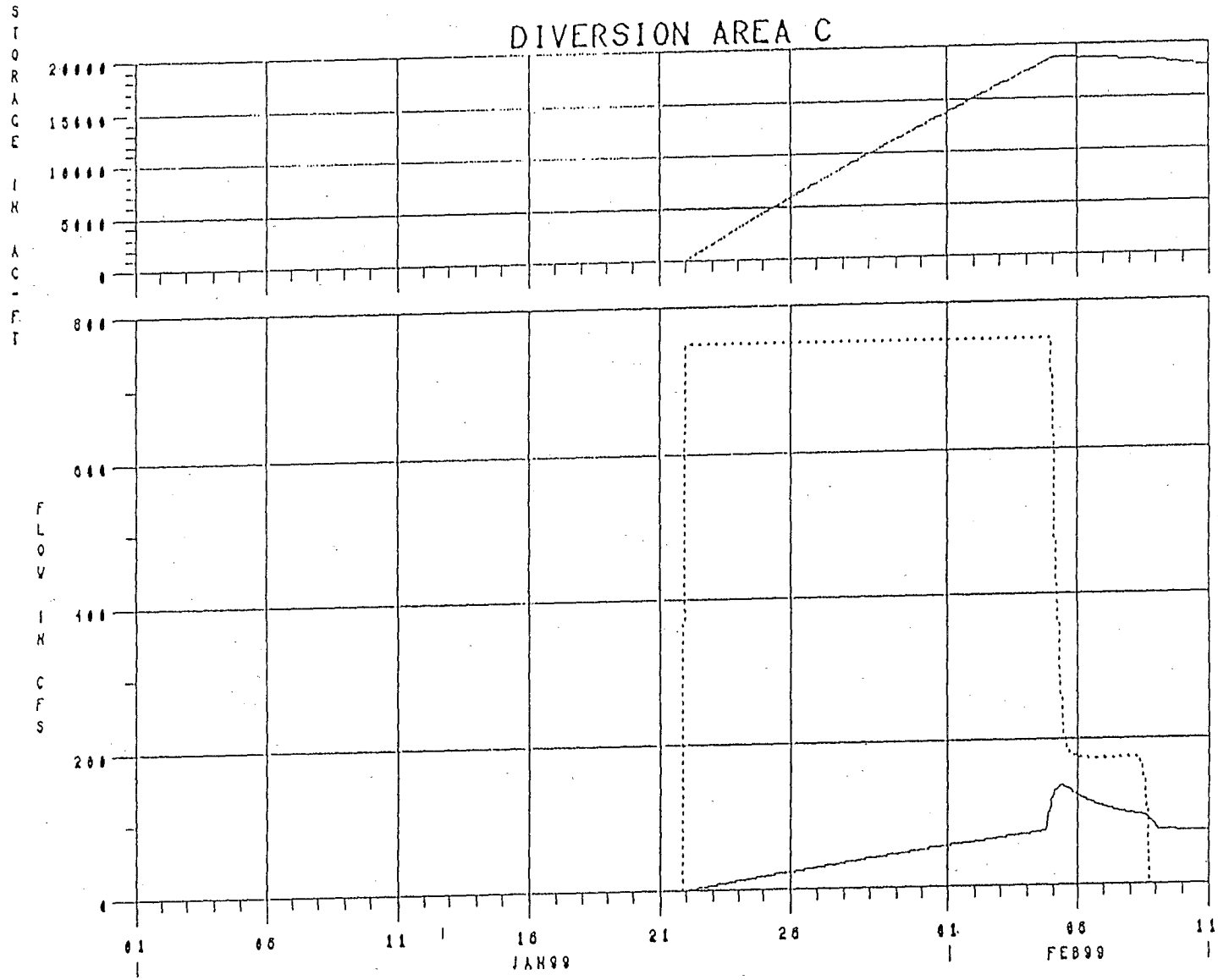

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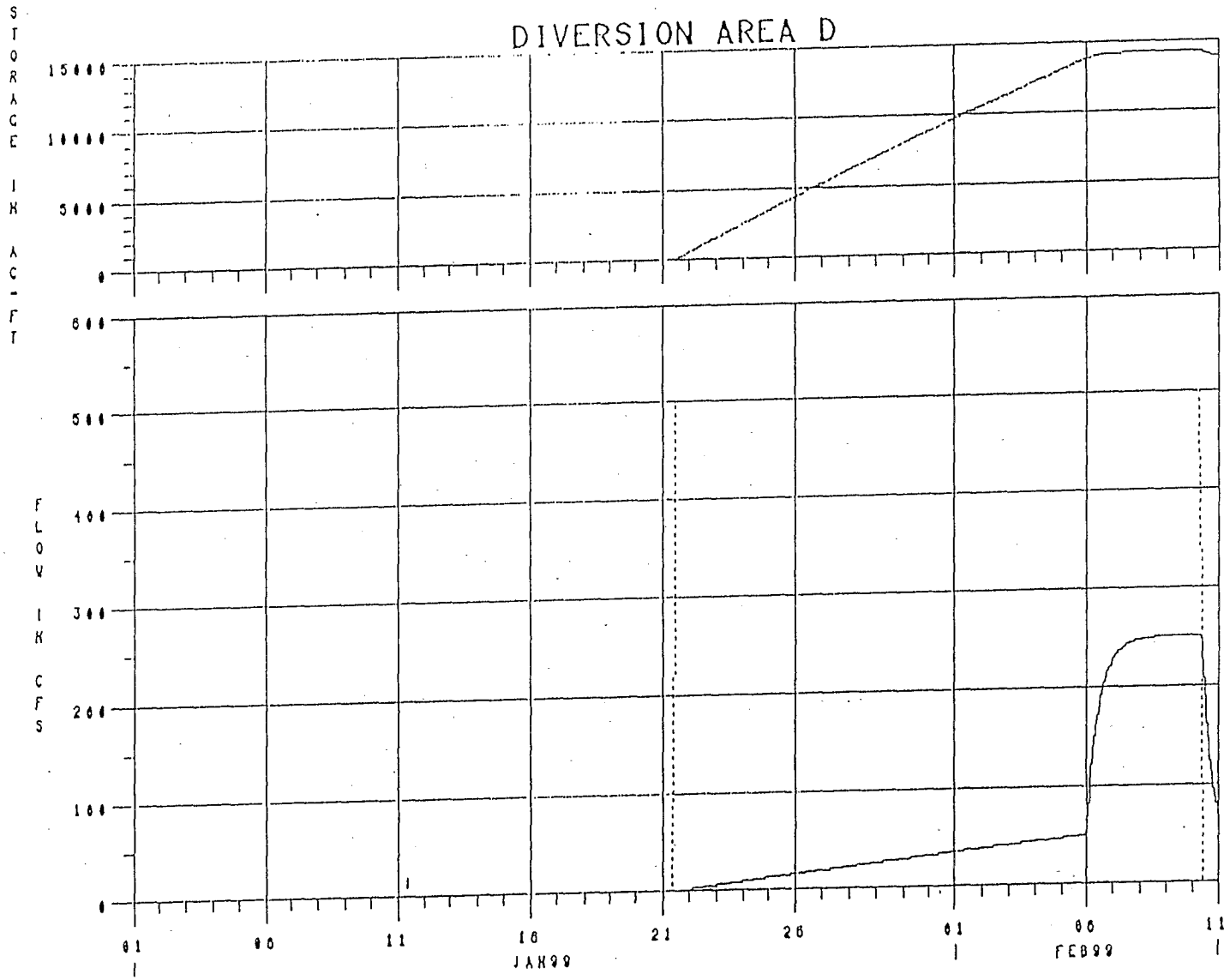

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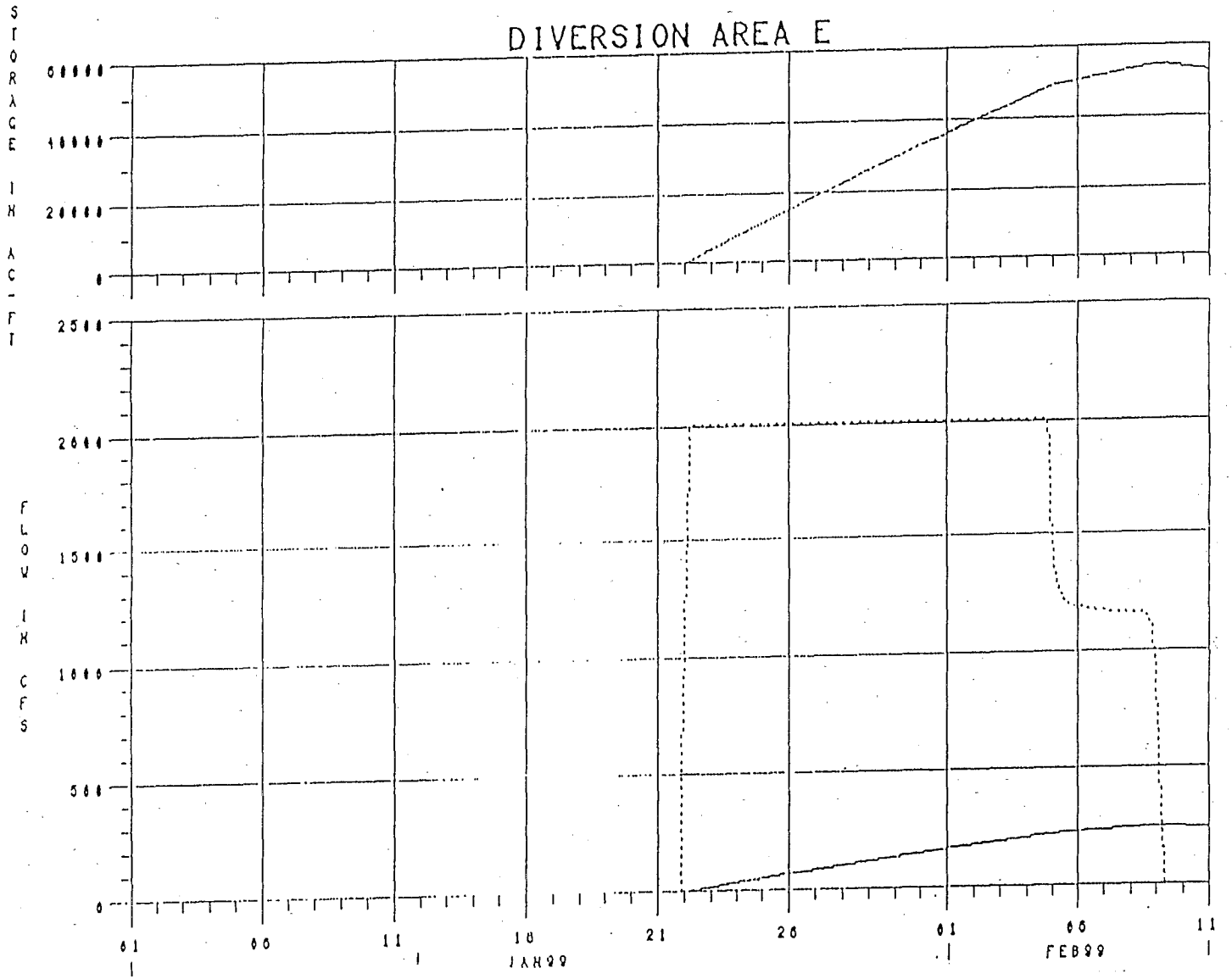

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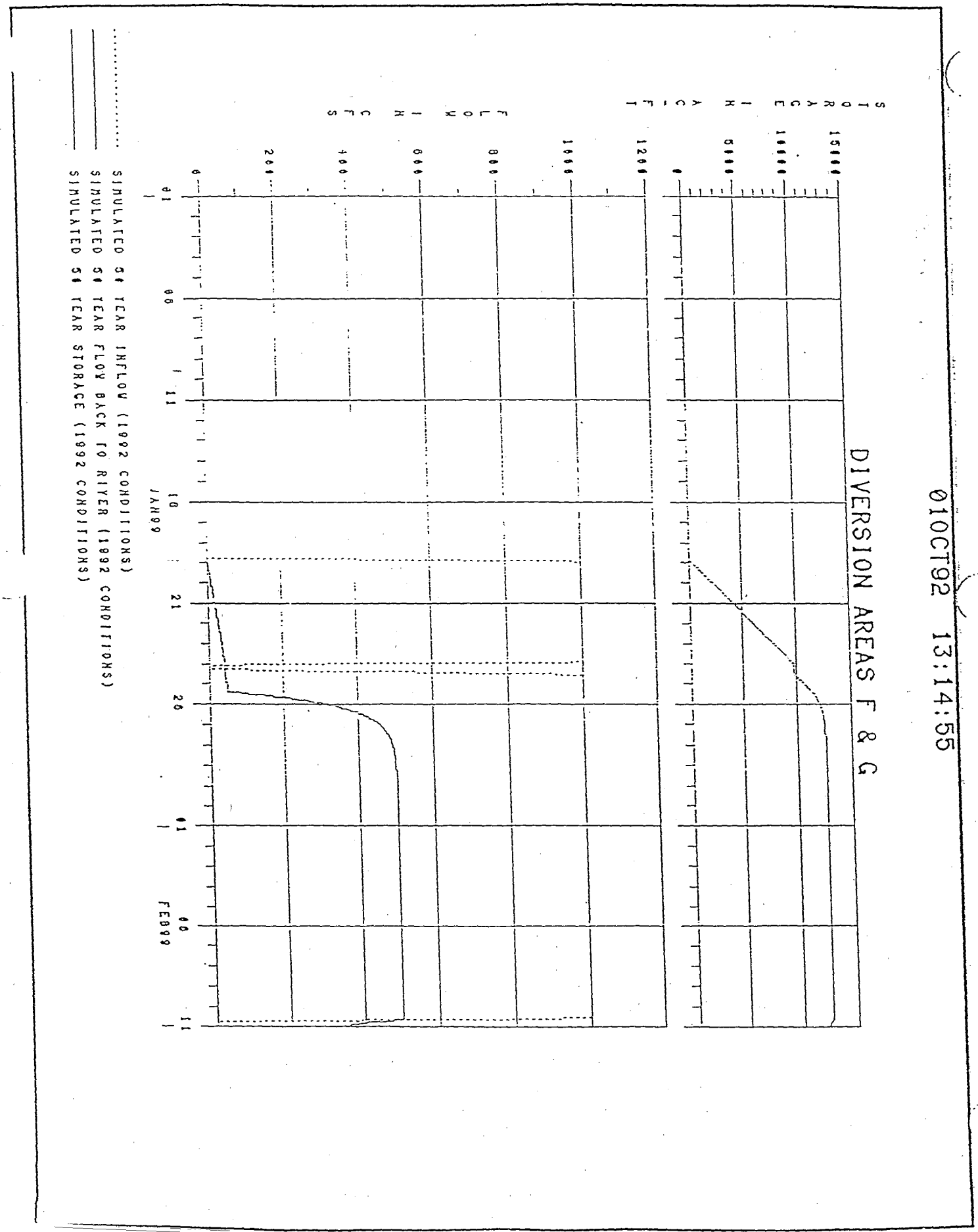

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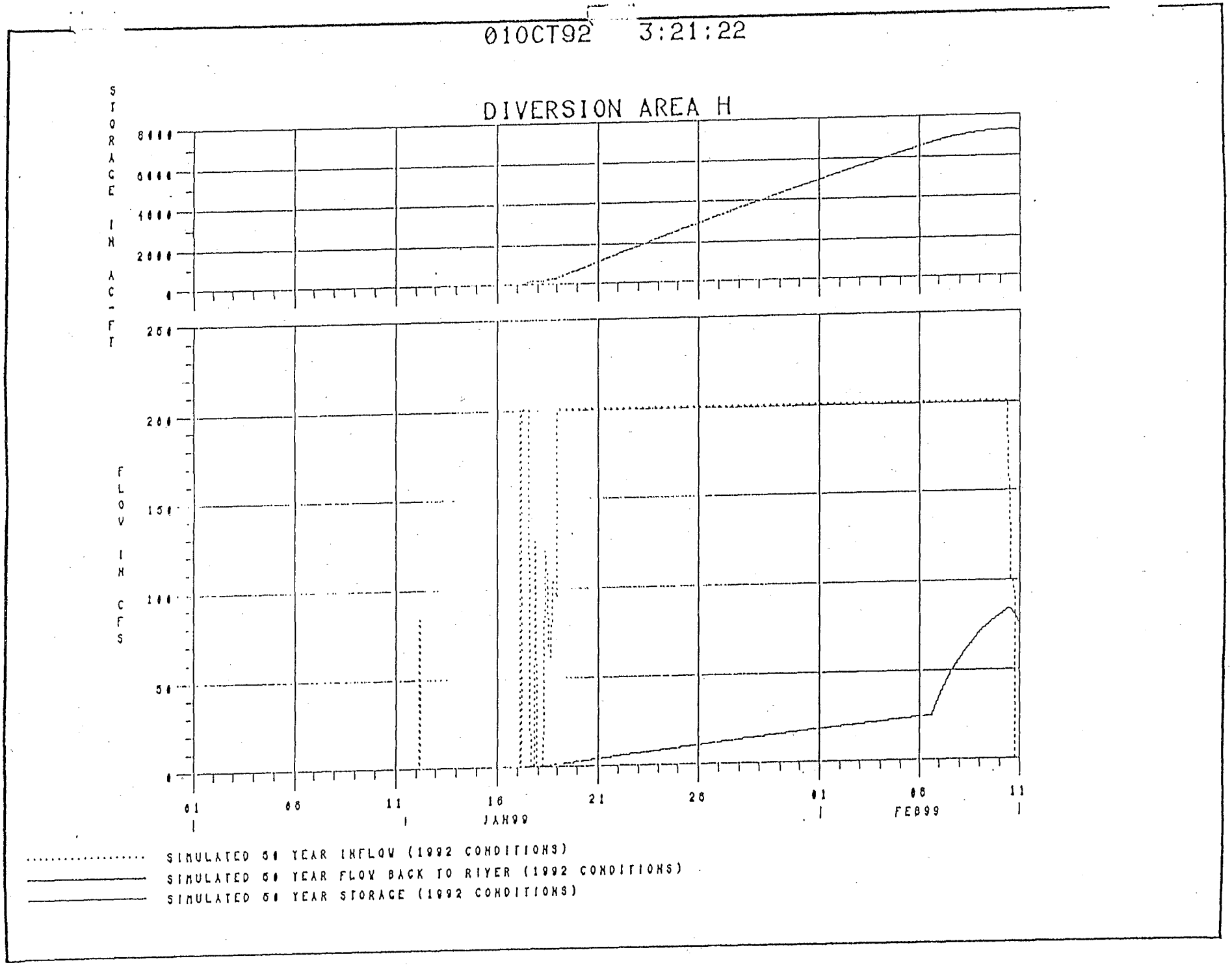

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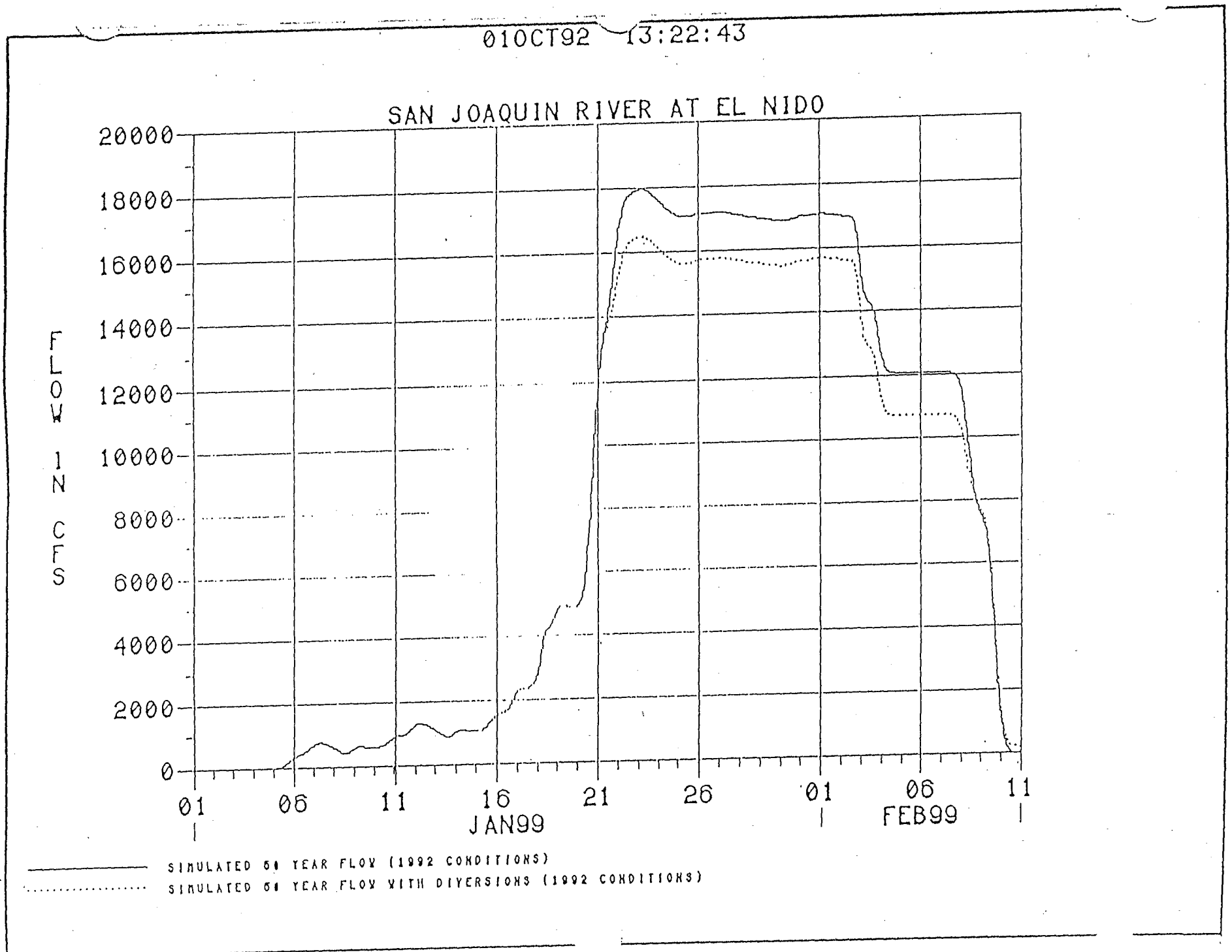

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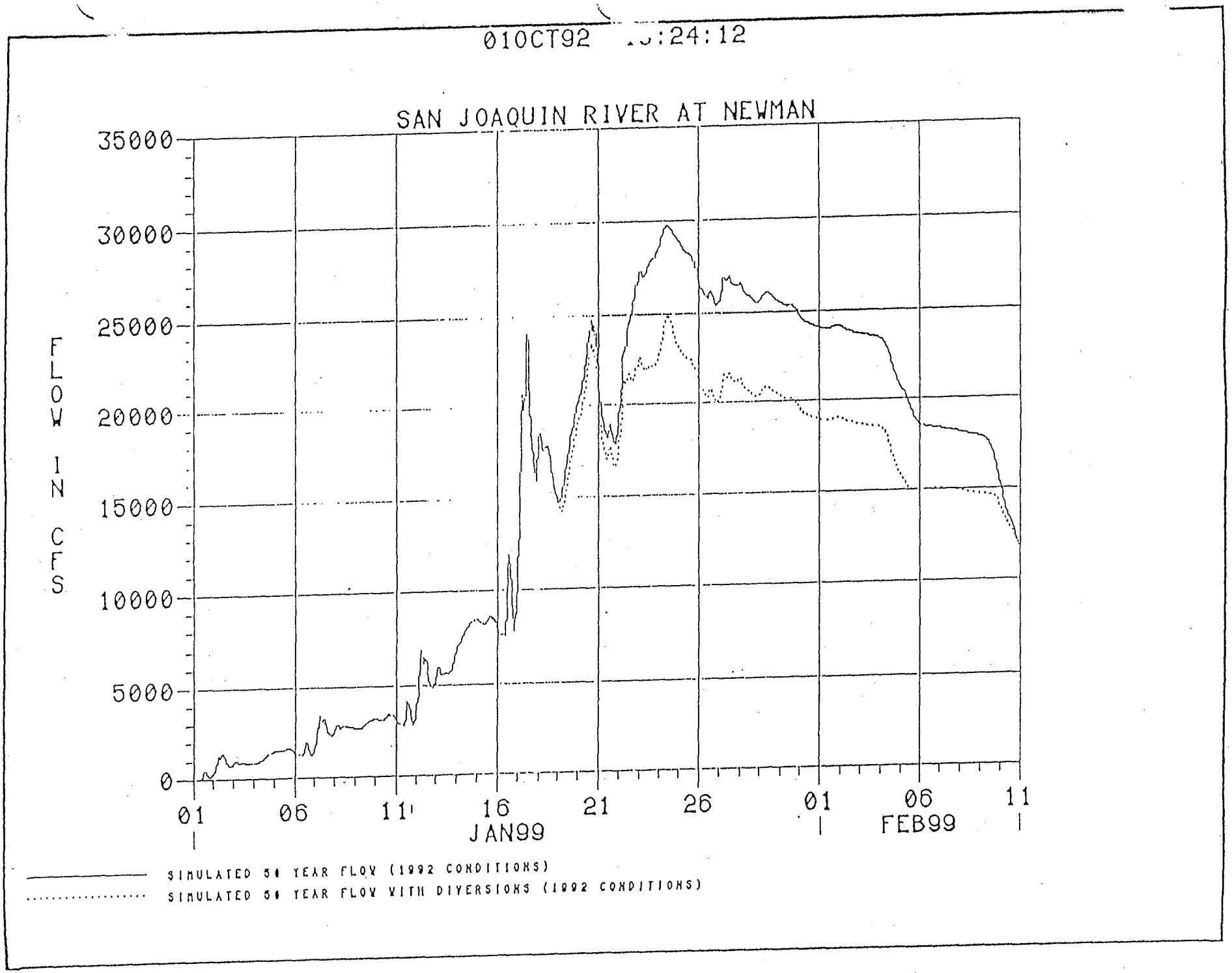

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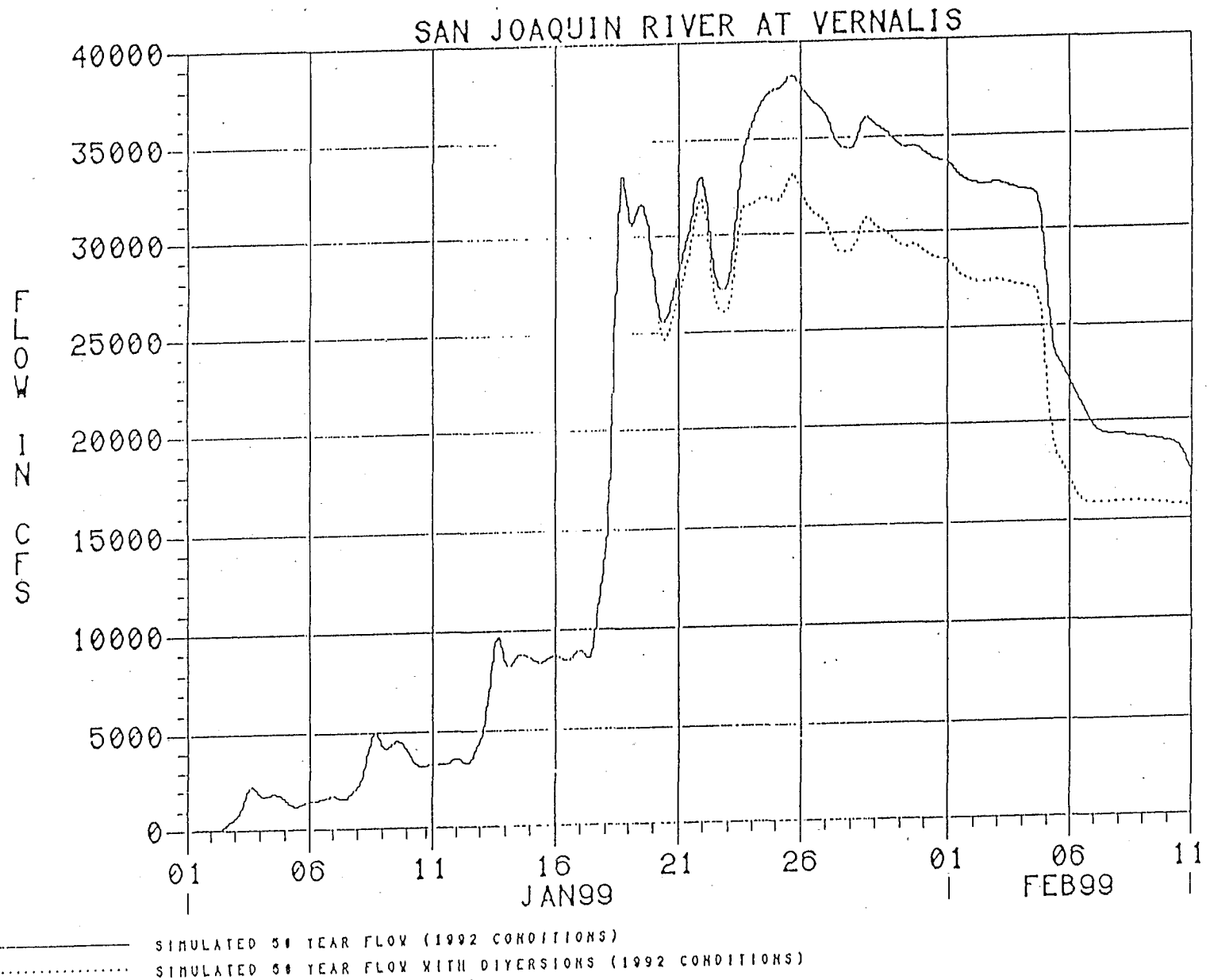

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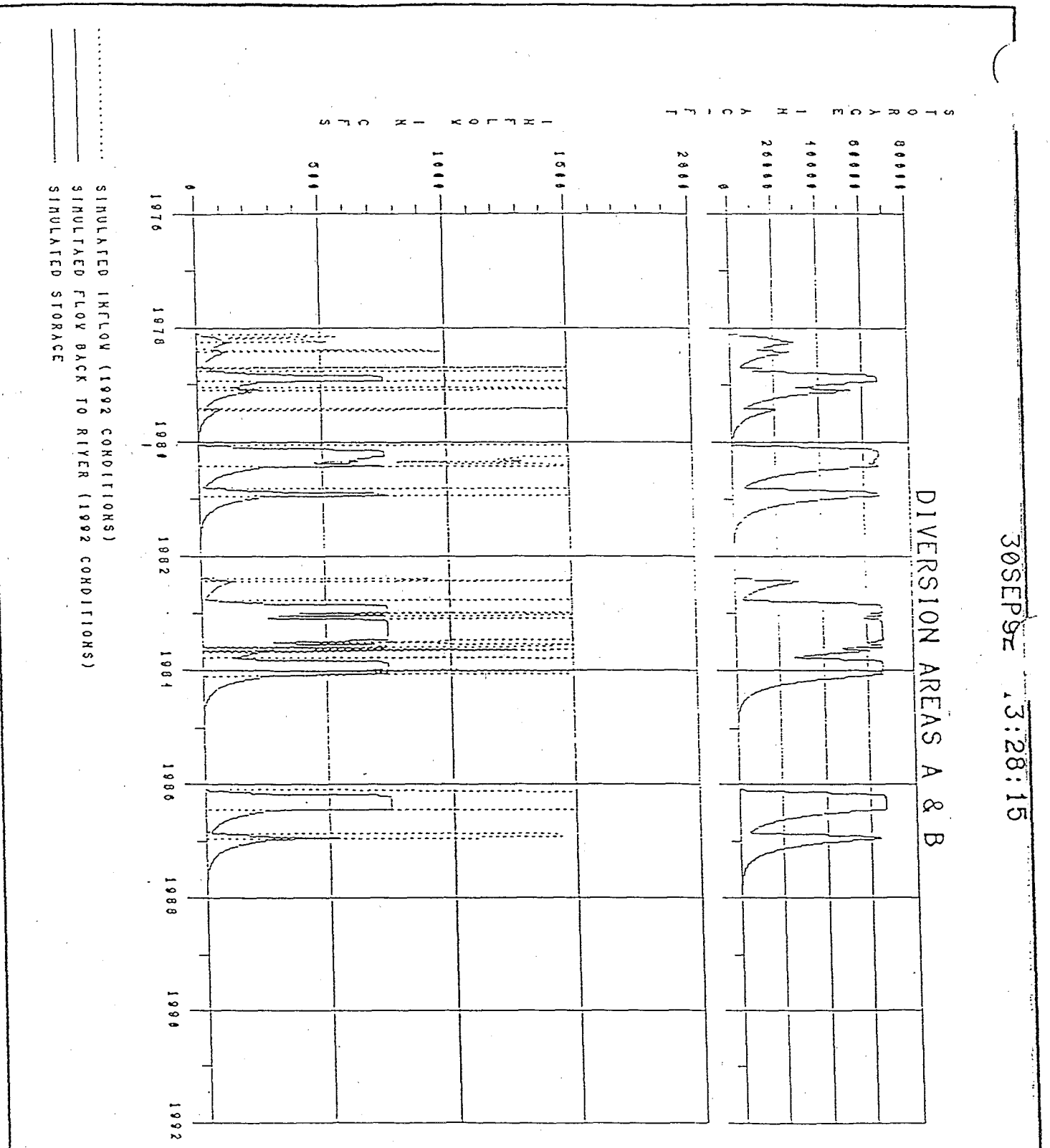

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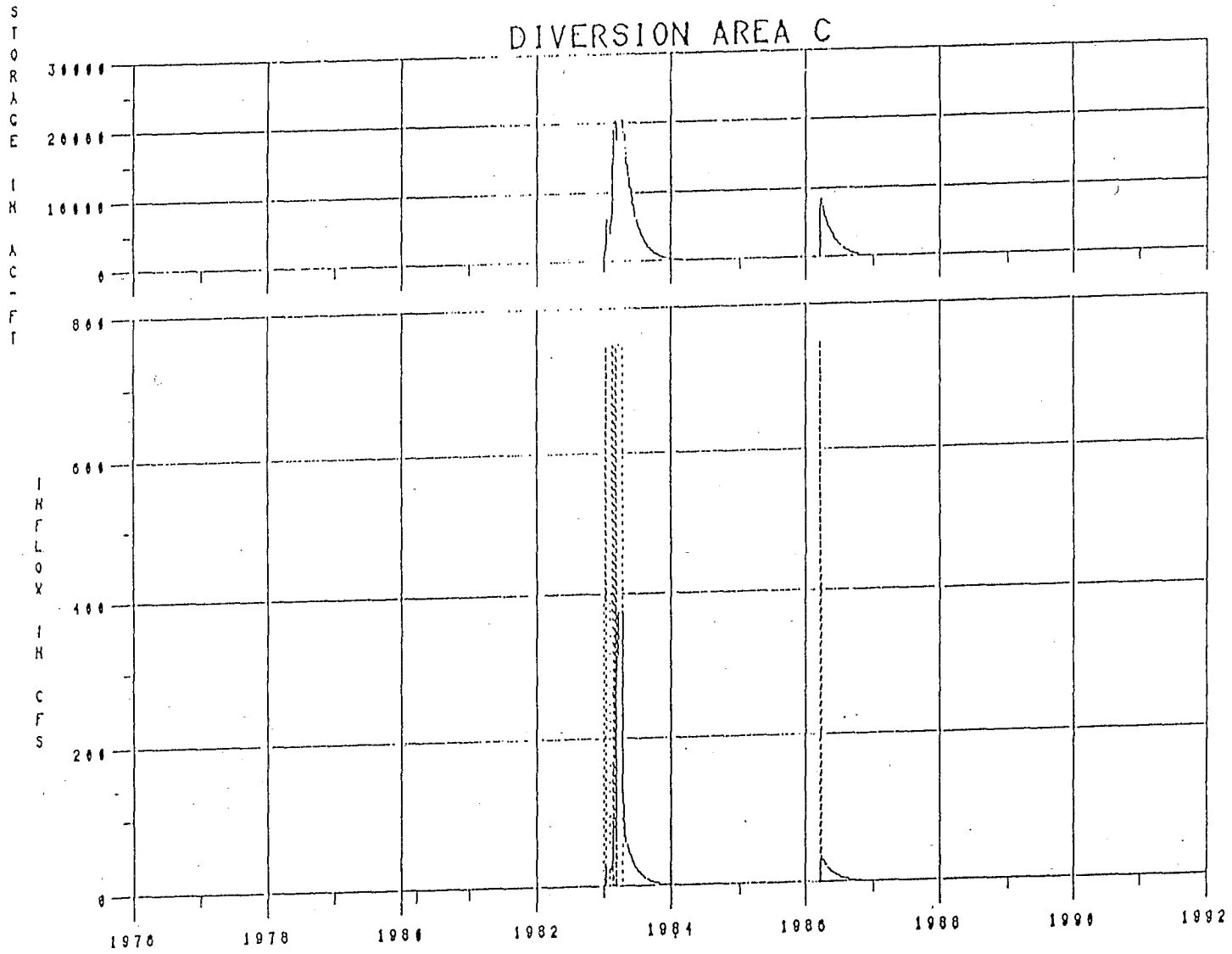

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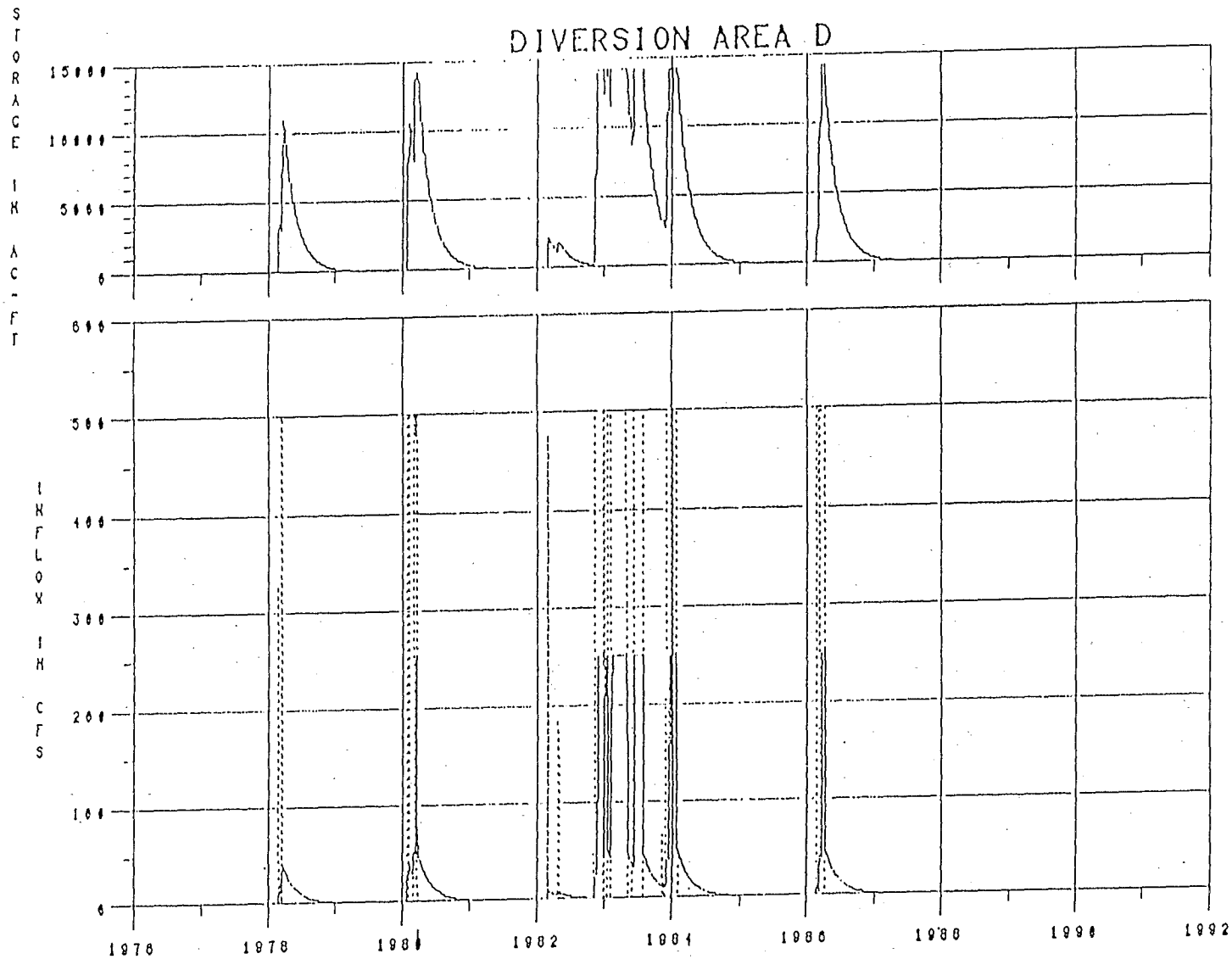

SIMULATED INFLOW (1992 CONDITIONS)
SIMULTAED FLOW BACK TO RIVER (1992 CONDITIONS)
SIMULATED STORAGE

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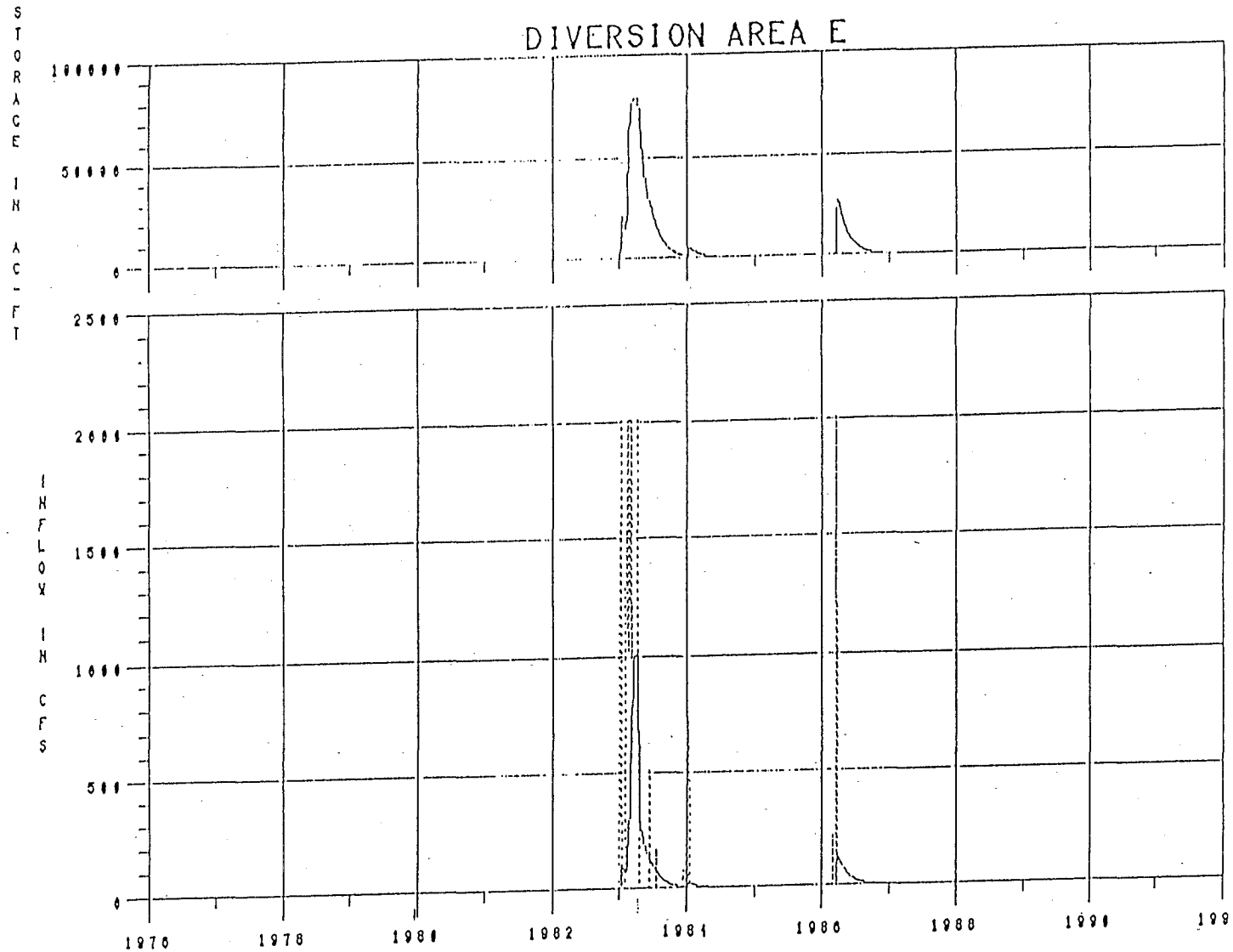

SIMULATED INFLOW (1992 CONDITIONS)
SIMULTAED FLOW BACK TO RIVER (1992 CONDITIONS)
SIMULATED STORAGE

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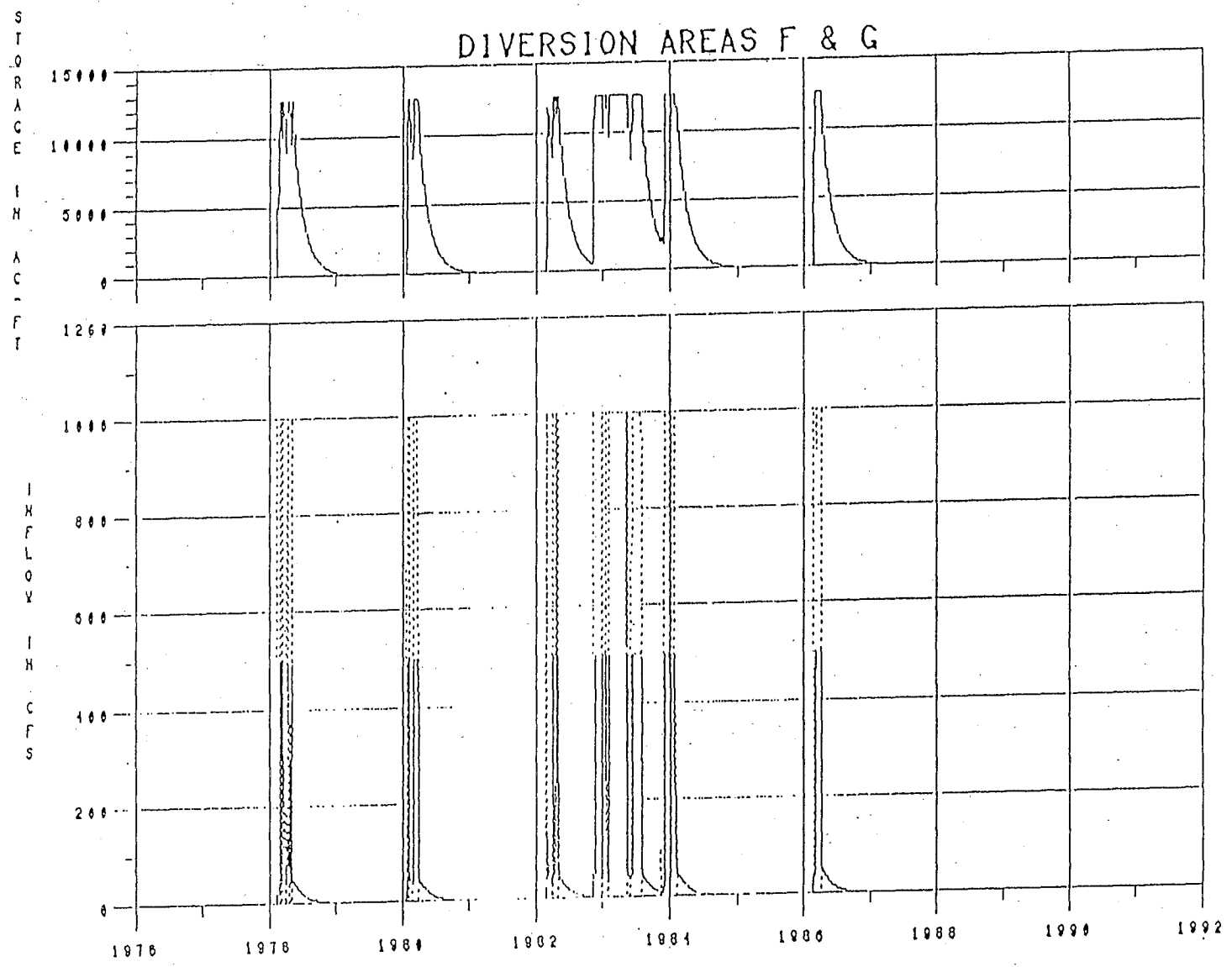

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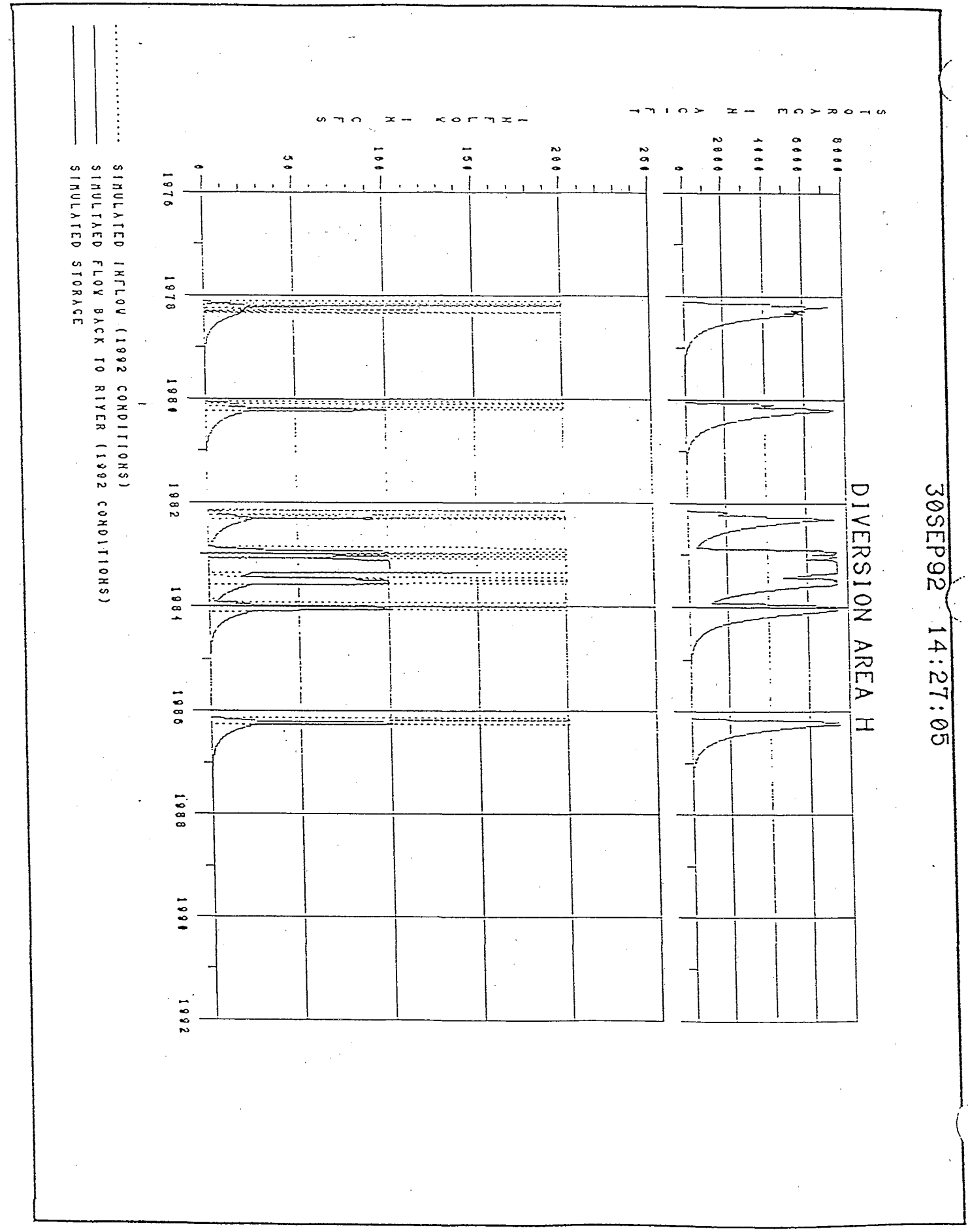
DIVERSION AREA H
30SEP92 14:27:05
STORAGE ACRE-FEET
8000
6000
4000
2000
0
INFLOW CFS
250
200
150
100
50
0
1976
1978
1980
1982
1984
1986
1988
1990
1992
SIMULATED INFLOW (1992 CONDITIONS)
SIMULTAED FLOW BACK TO RIVER (1992 CONDITIONS)
SIMULATED STORAGE

C-104670

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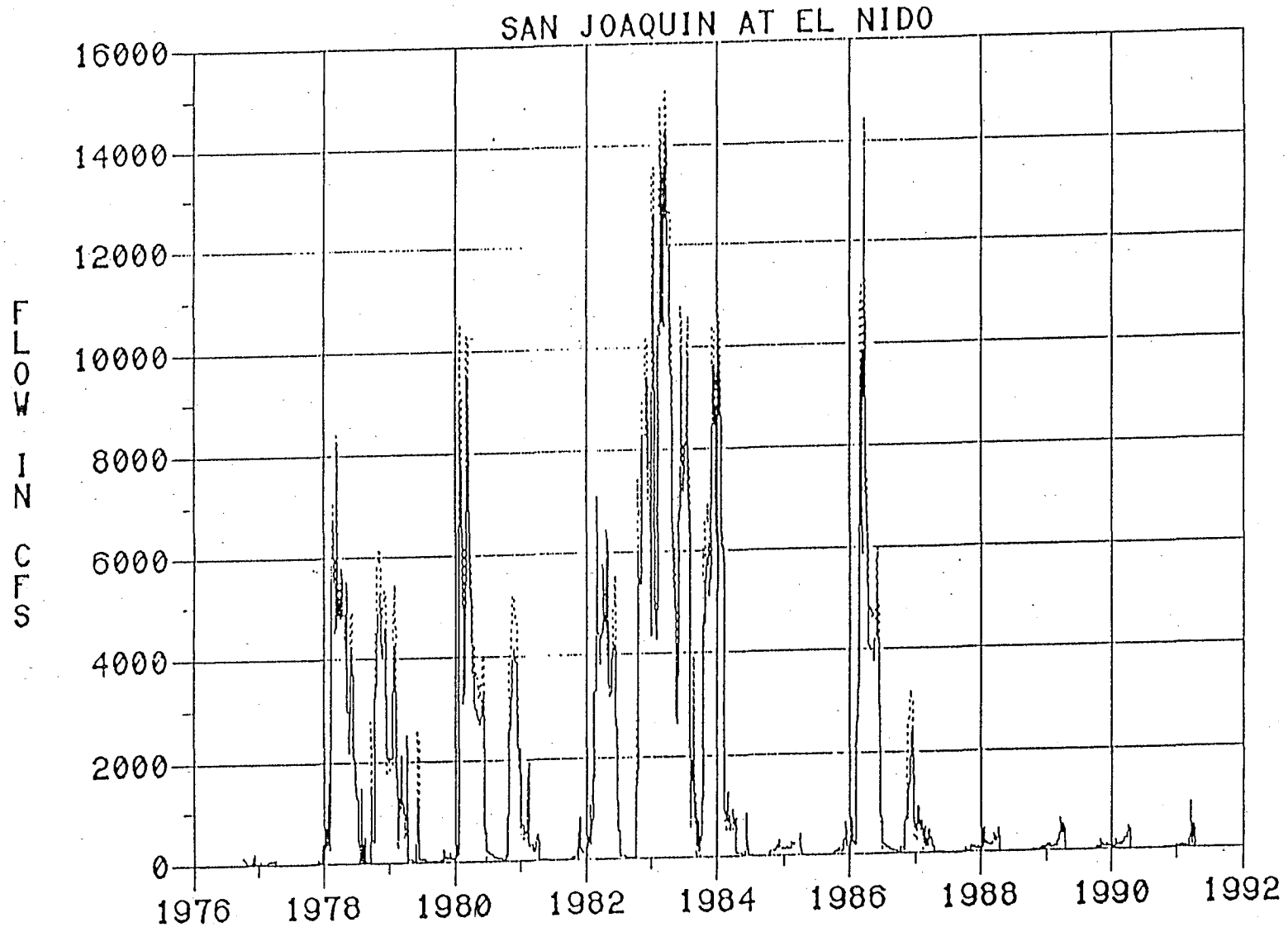

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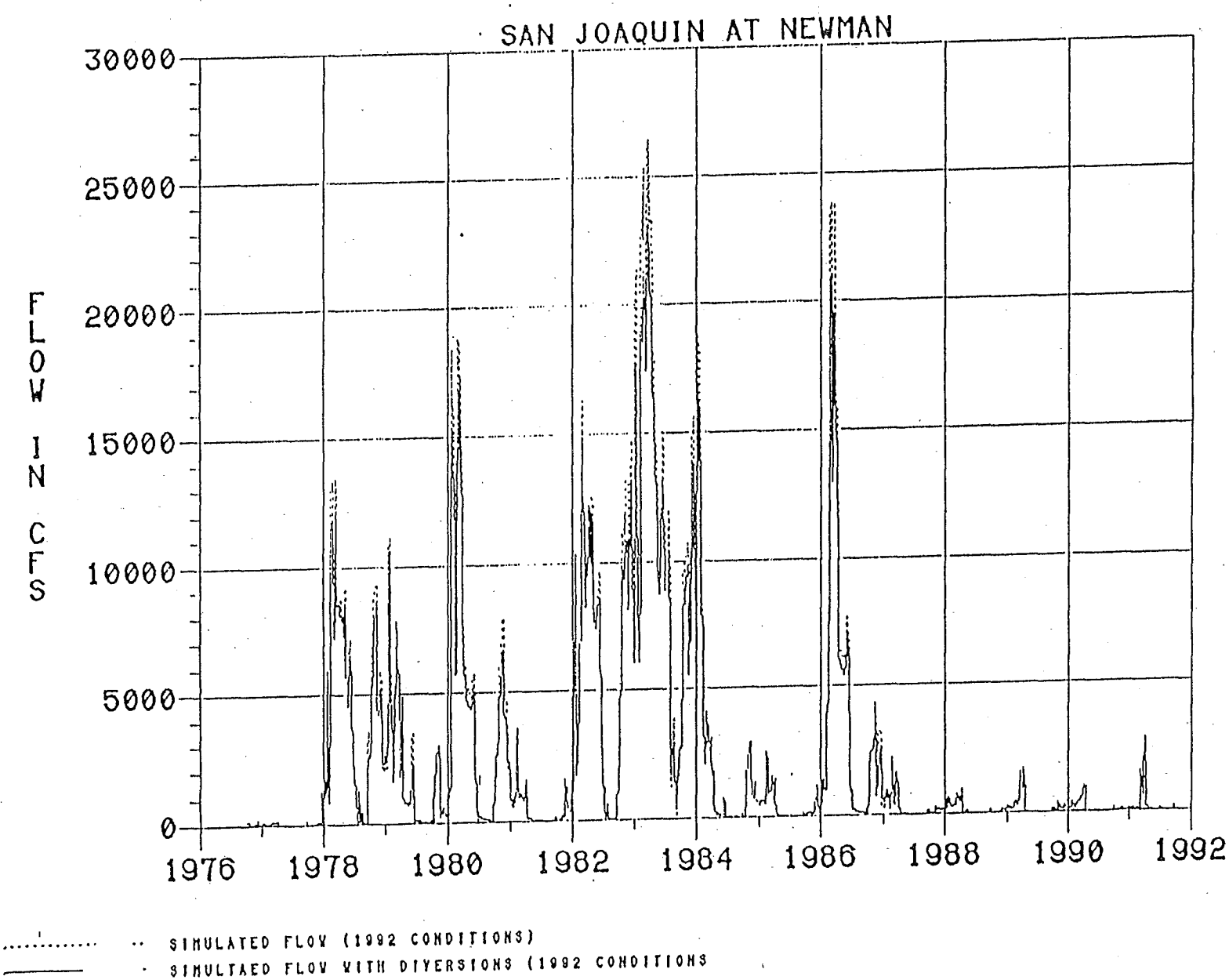

SIMULATED FLOW (1992 CONDITIONS)

SIMULTAED FLOW WITH DIVERSIONS (1992 CONDITIONS

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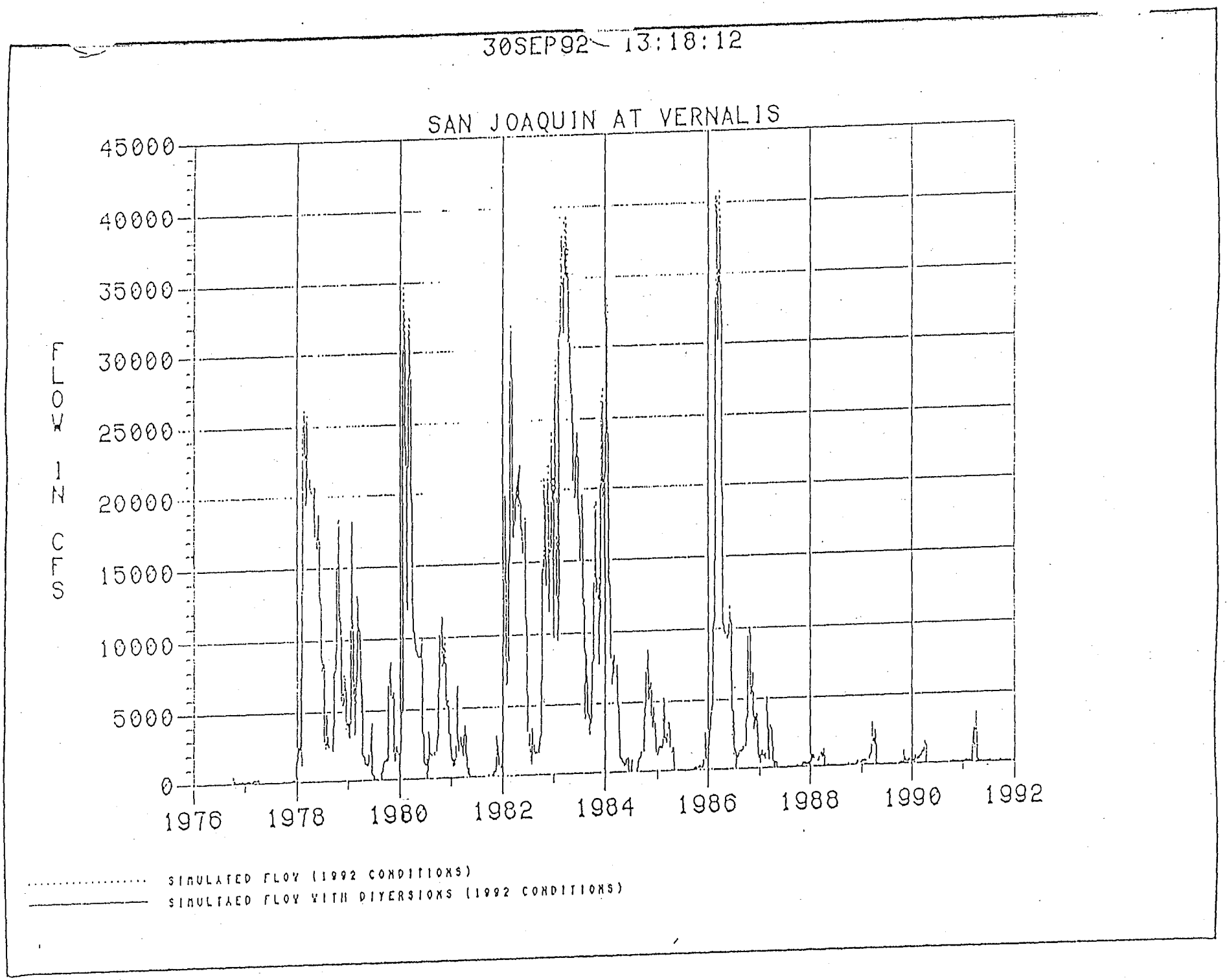

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FREQUENCY BASED ON 1-DAY REGULATED RAINFLOOD FLOWS (1992 CONDITIONS)	
WATER YEAR	FREQUENCY
1976	*
1977	*
1978	6-Year
1979	*
1980	13-Year
1981	*
1982	8-Year
1983	50-Year
1984	10-Year
1985	*
1986	20-Year
1987	*
1988	*
1989	*
1990	*
1991	*

* = More often than once every 5 years.

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